

**Bonneville Power Administration
Fish and Wildlife Program FY99 Proposal**

Section 1. General administrative information

**North Fork Malheur River Bull Trout And
Redband Trout Life History Study**

Bonneville project number, if an ongoing project 9107

Business name of agency, institution or organization requesting funding
Burns Paiute Tribe

Business acronym (if appropriate) BPT

Proposal contact person or principal investigator:

Name Daniel Gonzalez/Dyan Straughan
Mailing Address HC 71 - 100 Pasigo St
City, ST Zip Burns, Oregon
Phone 541-573-1375
Fax 514-573-2422
Email address gonfish@orednet.org / dyan@orednet.org

Subcontractors.

Organization	Mailing Address	City, ST Zip	Contact Name
Montana State University	Division of Biological Sciences University of Montana	Missoula, MT 59812	Paul Spruell

NPPC Program Measure Number(s) which this project addresses.
10.1, 10.1A.2, 10.2A.1, 10.5, 10.5A, 10.6

NMFS Biological Opinion Number(s) which this project addresses.
NA

Other planning document references.
NA

Subbasin.Malheur River Subbasin

Short description.

Identify the distribution of bull trout from Beula Reservoir to the headhead waters of the North Fork Malheur River. Sample the genetic composition of redband trout and bull trout to distinguish population characteristics. Identify the preferred habitat

Section 2. Key words

Mark	Programmatic Categories	Mark	Activities	Mark	Project Types
	Anadromous fish		Construction	+	Watershed
X	Resident fish		O & M	+	Biodiversity/genetics
	Wildlife		Production	X	Population dynamics
	Oceans/estuaries	X	Research	+	Ecosystems
	Climate	+	Monitoring/eval.	+	Flow/survival
	Other	+	Resource mgmt	+	Fish disease
			Planning/admin.		Supplementation
			Enforcement		Wildlife habitat en-
			Acquisitions		hancement/restoration

Other keywords.

Life History, Genetic Evaluation, Hatchery and Wild Trout Interactions, Exotic and Native Char Interactions , Ecological Interactions

Section 3. Relationships to other Bonneville projects

Project #		Nature of relationship
9701900		Bull Trout and Redband

Section 4. Objectives, tasks and schedules**Objectives and tasks**

Obj 1,2,3	Objective	Task a,b,c	Task
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1	Identify limiting factors to critical life stages of bull trout and redband trout	a	Screw traps will operate near the mouth of Beulah Res. and at the headwaters of the NF Malheur River
2	Determine a population estimate and age class structure for bull trout	b	Spawning surveys - lead by Oregon Department of Fish and Wildlife and BPT staff
3	Determine water quality	c	Using Aqua Check water quality instrument to measure DO, pH, and Conductivity- HOBO's for water temperature monitoring
4	Determine seasonal distribution of bull trout and time of movement	d	Radio Telemetry
5	Determine the timing of spawning and preferred spawning areas	e	Radio Telemetry
6	Determine the bull trout use and extent of Beulah Reservoir	f	Radio Telemetry and Screw Traps
7	Identify overall habitat conditions and preferred site conditions by bull trout and redband trout	g	Habitat surveys (Hankin and Reeves method), fish surveys (ODFW methods) and radio telemetry.
8	Continue quantifying genetic population structure in current bull trout and redband populations	h	Submit samples to laboratory and assist in analyses with qualified BPT staff member - Microsatellite DNA analyses
9	Determine the use of micro-refugia	i	Forward Looking Infrared (FLIR) videography. Approximately 60 miles of North Fork will be sampled

Objective schedules and costs

Objective #	Start Date mm/yyyy	End Date mm/yyyy	Cost %
1	4/1998	7/1999	26.00%
2	8/1998	11/2002	15.00%
3	4/1998	11/2002	10.00%
4	4/1998	11/1999	7.00%
5	5/1998	10/2002	7.00%
6	4/1998	11/2000	16.00%
7	6/1998	10/2000	6.00%
8	5/1998	11/2000	3.00%

9	7/1998	7/1999	10.00%
			TOTAL 100.00%

Schedule constraints.

Weather

Completion date.

2001

Section 5. Budget

FY99 budget by line item

Item	Note	FY99
Personnel	1 Biologist @ \$14.00 hr (2080 hr) and 1 Fisheries Technician @ \$8.10 hr (1080)	\$37,868
Fringe benefits	25% of Salary	\$9,467
Supplies, materials, non-expendable property	Waders, Dry Suit, Snorkle, Mask, Polarized Glasses,	\$796
Operations & maintenance	None	\$0
Capital acquisitions or improvements (e.g. land, buildings, major equip.)	None	\$0
PIT tags	# of tags: None	\$0
Travel	130 miles/day, 520 @ 4 days/week, 2080/month, @ 24,960/year, @ \$.31/mile	\$7,738
Indirect costs	29%	\$62,408
Subcontracts	Montana State University, DNA analyses @ \$65/sample	\$3,900
Other	Publication costs, report writing, per diem, + costshare with other agencies over period of 3 years	\$116,804
TOTAL		\$238,981

Outyear costs

Outyear costs	FY2000	FY01	FY02	FY03
Total budget	\$96,000	\$96,000	\$0	\$0
O&M as % of total	0.00%	0.00%	0.00%	0.00%

Section 6. Abstract

The goal of this project is to gain a cooperative understanding of the life history and genetic composition of the bull trout and redband trout in the Malheur River Basin. Little information is currently available concerning native trout populations, seasonal distribution and movements throughout the North Fork Malheur River. From past spawning surveys conducted by ODFW, Burns Paiute Tribe and USFS personnel, it seems somewhat apparent that bull trout numbers are relatively low. There is no information to indicate trend. Through the use of radio telemetry, screw traps, FLIR flights and genetic analyses we will be able to record and document the life history patterns of these species. This project will assist us in fulfilling the goals and objectives in section 10.1. It also complies with sections 10.1A.2, 10.2A.1, 10.5, 10.5A, 10.6 in the 1994 Columbia Fish and Wildlife Program. This project also compliments the management plans stated in Malheur Wild and Scenic River Management Plan and the North Fork Malheur Scenic River Management Plan directed by the USDA, U.S. Forest Service. Our expected completion date and completion of outlined objectives is 11/2001. Results will be monitored by continuing spawning surveys, surveying identified holding areas indicated by telemetry monitoring and FLIR flights, and identifying population trends throughout the species recovery.

Section 7. Project description

a. Technical and/or scientific background.

Project Description

There is no pre 1800 historic information on bull trout abundance in the Malheur River Basin. Their preference for extremely cold water probably limited their distribution naturally, but they would have had access all the way to the Snake River (Bowers et al 1993). Originally, the Malheur River drainage contained indigenous bull trout in both the North and Middle forks. The populations in the two forks have been isolated from each other since the construction of Agency Dam in the early 1900's and are thus managed and considered separate populations (Buckman et al 1992).

Redband trout (*Oncorhynchus mykiss gairdneri*) in the Malheur River system is also listed as a Category 2 candidate species under the federal Endangered Species Act. The taxonomy and classification of redband trout has in the past been in a state of controversy. However, Behnke, in 1992, stated that "For fisheries management, the major significance of separate evolutionary lines leading to coastal rainbow and interior redband trout does not concern correct taxonomy. Rather it concerns differences in the adaptive specializations the two forms have acquired over several thousands of years and how these differences can be accommodated in management programs." In particular, redband trout are adapted to harsh arid environments (Wishard, *et. al.*, 1984). Habitat degradation, as well as possible genetic deterioration, are the primary causes for the depletion of redband trout in the region. Construction of Warm Springs dam, Agency

dam on the North Fork Malheur and the Brownlee dam on the Snake, has interrupted natural gene flow within the population (Pribyl and Hosford, 1985) in addition to the stocking of non-native trout that were stocking in the region. Protein work done by Ken Currens in 1996 demonstrated that there was number of populations in the Snake River and Harney Basin that have diverged from the typical ranges of the allele frequencies found inland rainbow trout of the Columbia River. He suggested that this could be one of two things; possible hybridization with non-native trout, or that these native populations may be more diverse than previously assumed

In the North Fork Malheur River, subpopulations of these separate populations are documented in Swamp Creek, Sheep Creek, Flat Creek, Elk Creek, and Little Crane as well as the North Fork River itself (USDA (1)1994). In August 1997, crews from the Burns Paiute Tribe also found an adult bull trout in Crane Creek approximately 1-mile west from the confluence of Little Crane Creek. Bull trout in this area of the North Fork have been historically documented but not in recent years. This leads us to believe that their distribution is increasing. The finding was by chance during a hook and line survey. Other tributary streams to the North Fork may contain bull trout and are identified as potential habitat for the species by the U.S. Forest Service and Oregon Department of Fish and Wildlife. The periodic appearance of large bull trout in Beulah Reservoir indicates that the entire portion of the North Fork receives use by bull trout.

The Malheur National Forest Plan designates bull trout as an indicator species for non-anadromous fish and riparian habitat on the forest. The assumption is that management activities that affect bull trout will affect a variety of other species in the same or similar habitat. Likewise, measures to protect the indicator species will protect other species as well (Buckman et al 1992).

Construction of Agency Dam on the North Fork Malheur in 1935 at approximate RM 18 ended anadromous runs in that river and prevented any opportunity for interchange between bull trout populations in the Middle Fork and the North Fork Malheur (Bowers et al 1993). Bull trout populations in eastern Oregon have been declining (USDA (1) 1993). In part, this is due to several factors associated with the degradation of their environment and chemical treatments. In the Malheur River Basin, as mentioned, bull trout and redband trout are listed as a category 2 species under the Endangered Species Act, which means that additional information is required before a decision about listing can be made (USDA (2) 1993).

A physical and biological survey was conducted in the North Fork Malheur in 1972. Bull trout were found at three sample sites between RM 39.25 and 55.75 on the mainstem; in Little Crane Creek and Swamp Creek (Bowers et al 1993).

This life history study is designed to record the movements and seasonal patterns of bull trout. The study will also assist our understanding of spawning cycles and preferred water temperatures during their migrational distribution. We will begin with the North Fork of the Malheur starting at Beulah Reservoir and end at the headwaters or the upper

limits of bull trout migrations. Eventually we will include information gathered from the Stinkingwater Salmonid Project, starting at Warm Springs Reservoir and continuing through the mainstem of the Middle Fork Malheur and its tributaries.

The North Fork was chosen as the initial starting point because there are no brook trout within this system. Studies done by Oregon Department of Fish and Wildlife (1996) show that brook trout have a reproductive advantage over bull trout because they mature earlier as adults do. It is more common for male brook trout to mature at their second or third year and female brook trout mature in their third or fourth year (Buchanan et al. 1994). Resident bull trout reach sexual maturity at the age of 5 to 6; where as some migratory forms were found to mature as late as 9 years in some river systems (Buchanan et al. 1994). Thus creating a significant disadvantage when competing with brook trout.

The North Fork has never been stocked with brook trout. The bull trout sampled in this section would be genetically pure with no threat of hybridization. Although there is a high possibility of bull/brook trout hybrids in the Middle Fork, through historical record and some genetic analyses, we can distinguish the population characteristics.

The Middle Fork River and its tributaries are heavily populated with brook trout. Our surveys on Summit Creek indicated that the majority of the brook trout concentrations are in direct conflict with bull trout habitat. Within this system, they prefer the same habitat, spawn at the same time and compete for space and food. After performing this telemetry survey of bull trout in the absence of brook trout, we will develop a telemetry survey method that will allow us to compensate for the high numbers of brook trout during our surveys of the Stinkingwater Salmonid Project.

Information on bull trout populations and life history is very limited within the Malheur River Basins. We will attempt to use the latest technology in tracking devices to gather reliable information to assist our management of these sensitive species. There will also be efforts made by the Paiute Tribe to gather water quality data on both watersheds. This information will give us a good understanding of the water conditions during the critical activity periods of bull trout distribution.

This study would comply with Columbia River Basin Fish and Wildlife Program 1994, mitigation for bull trout. According to the program, the Council believes these studies and evaluations should be undertaken and completed, quickly, and on-the-ground projects identified and implemented as soon as possible to address the needs of this species. In addition, these studies should be coordinated to avoid redundant work to increase the learning potential.

We have coordinated a costshare agreement with several other federal and state agencies as well as special interest groups and volunteers. This funding would satisfy our further investigation of the bull trout and redband life history study in the Malheur River Basin. This study would further compliment the ongoing Stinkingwater Project funded for the Middle Fork Malheur River.

b. Proposal objectives.

Objectives

- 1) Identify limiting factors to critical life stages of bull trout in the North Fork and Middle Fork Malheur River Systems.
- 2) Determine a population estimate and age class structure for the Middle Fork (starting at Warm Springs Reservoir) and North Fork Malheur River (starting at Beulah Reservoir)
- 3) Determine water quality within the mainstem of both systems.
- 4) Continue ongoing water temperature monitoring.
- 5) Determine seasonal distribution of bull trout and timing of movement.
- 6) Determine the timing of spawning activities and identify preferred spawning areas and those factors that lead in identifying these sites.
- 7) Determine the use of micro-refugia, i.e. springs or seeps that may act as cool water holding pockets during peak temperature periods.
- 8) Determine the use and the extent of use in Beulah and Warm Springs Reservoirs. In addition, we will attempt to estimate the possible loss of fish due to spill over from reservoirs.
- 9) Identify an overall evaluation of the current habitat conditions, with emphasis in determining the movement of populations and/or habitat utilization.
- 10) Continue quantifying genetic population structure in current bull trout populations.

c. Rationale and significance to Regional Programs.

In addition to the loss of anadromous fish in this area, resident fish have also suffered significant losses due to land-use factors such as timber harvest, livestock production and irrigation withdrawals resulting in habitat degradation. For some time, it has been known that bull trout populations (*Salvelinus confluentus*) have been declining throughout their range (Howell and Buchanan, 1992; Kostow, 1995). Anecdotal information from long time residents in the area, indicates that bull trout were taken as far downstream as Wolf

Creek (RM 168) in 1955 when both the North and Middle Forks of the Malheur were chemically treated (Bowers, *et. al.*, 1993). In 1993 Bowers *et. al.*, noted that in recent surveys of tributaries of the Middle Fork, bull trout were found in only two creeks, Lake Creek (RM 195) and Big Creek (RM 190). In the summer of 1997, crew members from the Burns Paiute Natural Resources, caught one bull trout on Crane Creek. Ratliff and Howell, in 1992, listed habitat degradation as the primary cause for depletion of bull trout in this area. The opening of the canopy increases solar radiation and can warm the stream to temperatures that exceed bull trout requirements. Additionally, bull trout was held in low regard by anglers and fishery managers due to its supposedly poor fighting qualities and piscivorous habit (Bond, 1992). The Oregon Department of Fish and Wildlife stocked non-native brook trout throughout the Middle Fork Malheur and its tributaries. Brook trout pose a serious threat to bull trout populations due to habitat competition and their ability to hybridize with bull trout resulting in a loss of genetic integrity (Ratliff and Howell, 1992; Leary, *et. al.*, 1983). Furthermore, the Warm Springs dam on the Middle Fork prohibits the migration of adfluvial fish to the Middle Fork, causing additional genetic losses. Currently, bull trout in the Malheur River system are listed as a Category 2 candidate species under the federal Endangered Species Act. The Middle Fork population is at high risk with less than 700 fish.

The Pacific Northwest Electric Power Planning and Conservation Act of 1980 called for recommendations to develop a program to protect, mitigate, and enhance fish and wildlife on the Columbia River and its tributaries that were affected by the development of hydroelectric activity. In 1997, the Burns Paiute Tribe (BPT), with funding provided by Bonneville, began developing a Fisheries Natural Resources Department with the intent to recover and preserve the health of native resident fish in the Malheur Basin.

The Burns Paiute Tribe has been working closely with area agencies to develop this project so that it is in line with the objectives outlined in the ODFW's Malheur River Basin Fish Management Plan (1990) as well as the Malheur Wild and Scenic River Management Plan (USDA, 1993). Additionally, this project addresses several measures in the Power Planning Council's program, as well as management strategies outlined in the Resident Fish Manager's Caucus (1997). Past management practices and hydroelectric facility construction has altered the habitat to such an extreme that many of the native salmonids are extinct, threatened or endangered in the region. The objectives outlined in this proposal will begin to mitigate for the loss of anadromous fish in the region and compensate for the losses incurred by resident fish through habitat disintegration.

d. Project history

Not Applicable

e. Methods.

Operational Tasks (Methods)

- 1) Screw Traps - These traps will operate between May/June to September/October on the North Fork Malheur River at sites near Crane Crossing, approximately 15 river miles below the headwaters. The second site will be placed immediately above Beulah Reservoir, approximately 40 mile from the headwaters. The traps are expected to operate in the North Fork for two years and then placed in the Middle Fork system during FY 2000 and 2001. Target species will be marked and recorded at the trap sites to contribute to population estimates and to maximize trap efficiency.
- 2) Radio Implanting - Trapping of fluvial and resident forms will allow us to implant micro-radio transmitters. We will tag fluvial types at the first trap near the mouth of Beulah Reservoir and resident forms at the trap near the headwaters. Thirty tags are expected to be employed (10 juvenile and 20 adult) during the first year of this project. Depending on the results of this effort, it is expected that 30 - 50 tags will be employed during FY 1999 and 2000. Tracking duration will be dependent on the life expectancy of each radio transmitter.

These fish will be tracked via walking and hiking, vehicle and airplane. Oregon Department of Fish and Wildlife is expecting to secure a minimum of 10 airplane flights from Oregon State Police. This plane is equipped with radio receivers and is routinely used in fish and wildlife tracking.

Fluvial adult fish will be collected during the spring months in Beulah Reservoir using traps and fyke nets. Radio tags and possibly PIT tags will be implanted to gather seasonal movement information. Traps and fyke nets have been periodically used in reservoir inventories in the past 10 years and have proven effective in trapping bull trout.

- 3) Water Quality - The Burns Paiute Tribe will evaluate the water quality throughout the North Fork and Middle Fork survey sites. We will be using an Aqua Check water quality instrument that measures conductivity, dissolved oxygen, percent hydrogen and temperature. There is also a possibility that we will measure nitrogen and phosphorous using a HACH Kit (this is dependent on funding and personnel).
- 4) FLIR Flights - Identification of cold water refugia and stream temperature profiles using Forward Looking Infrared (FLIR) videography. Approximately 100 mile of stream miles has been identified on both North Fork Malheur (40 miles) and Middle Fork Malheur (60 miles). Flight will begin at the Warm Springs Reservoirs (on the Middle Fork) and at Beulah Reservoir (on the North Fork) and proceed upstream to the headwaters including two major tributaries (Lake Fork and Big Creek) on the Middle Fork Malheur River. We will snorkel these cool water pockets to verify bull trout utilization.
- 5) Water Temperature Monitoring - A relatively large collection of water temperature

data (using HOBO and Data Pod recording instruments) has become available through the efforts of the Burns Paiute Tribe, USFS, BLM, and ODFW. This part of the project will provide the time to coordinate and implement this task under the leadership of the Burns Paiute Tribe. Through the use of thermographs and telemetry, we will identify temperatures experienced by bull trout in the basin.

- 6) Spawning Surveys - For the Past four years, Oregon Department of Fish and Wildlife has been leading the spawning surveys on the North Fork Malheur system. Funding for a continuation of this partnership with ODFW, BLM and the Burns Paiute Tribe is through current funding sources. This task will assist us in identifying seasonal movements, spawning area preference, and estimates in adult spawning populations and trend.
- 7) Genetic Sampling - We will take samples for genetic analyses from radio tagged bull trout. Montana State University has agreed to continue analyzing our samples to stay consistent with their previous analyses. Upon completion of our project, we will be able to compare the North Fork samples with the Middle Fork samples and better define any genetic variation within the two disjunct populations.

f. Facilities and equipment.

Computer: 1 Pentium PC personal computer, 1 printer, connection to e-mail and internet

Software: MS Office 97, Paradox 7, and Onset thermograph package

Field Equipment: 1 travel trailer and one 4 person boat will be used through in kind services from Oregon Department of Fish and Wildlife, 1 field vehicle, provided by the Tribe, 2 screw traps, misc. support cable, 30 implantable radio transmitters, 2 radio receivers, 2 antennae, 2 dry suits, 2 snorkel, 2 masks, 2 sets of chest or hip waders, first aide kits, digital camera.

Facilities: The Paiute Reservation will provide office facilities for personnel.

g. References.

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Section 8. Relationships to other projects

The North Fork has never been stocked with brook trout. The bull trout sampled in this section would be genetically pure with no threat of hybridization. Although there is a high possibility of bull/brook trout hybrids in the Middle Fork, through historical record and some genetic analyses, we can distinguish the population characteristics. Within a year or less, this project will move to the Middle Fork (mainstream).

The Middle Fork River and its tributaries are heavily populated with brook trout. Our

surveys on Summit Creek indicated that the majority of the brook trout concentrations are in direct conflict with bull trout habitat. Within this system, they prefer the same habitat, spawn at the same time and compete for space and food. With the help of other agency biologists, we will develop a telemetry survey method that will allow us to compensate for the high numbers of brook trout during our surveys in the mainstem and its tributaries.

Information on bull trout populations and life history is very limited within the Malheur River Basins. We will attempt to use the latest technology in tracking devices to gather reliable information to assist our management of these sensitive species. There will also be efforts made by the Paiute Tribe to gather water quality data on both watersheds. This information will give us a good understanding of the water conditions during the critical activity periods of bull trout distribution.

Section 9. Key personnel

Daniel Gonzalez

Education: Bachelors of Science, Fisheries Science. Oregon State University. 1996
Bachelors of Science, Wildlife Science. Oregon State University, 1995
Fisheries and Wildlife Biologist. Burns Paiute Tribe. Burns, Oregon. 1997-Present. FTE 2080. Duties include implementing and assisting with project design, field collection, analyzing and interpreting data and active in Harney County and Malheur-Owyhee Watershed Councils and the Governors Watershed Enhancement Board.

Dyan Straughan

Education: Masters of Science, Population Genetics. California State University, Long Beach. 1997
Bachelor of Science, Biology major, Chemistry minor. University of Oregon. 1994
Tribal Biologist/Geneticist. Burns Paiute Tribe. Burns, Oregon. 1997-Present. FTE 2080. Duties include assisting and implementing project design, field collections, analyzing and interpreting data, monitor and administrate all budget activities.

Section 10. Information/technology transfer

Project results will be published in Boneville Power reports and, where applicable with other resource management agencies. Monthly or quarterly reports will be sent to local watershed councils (Harney County and Malheur - Owyhee). These results will also be submitted for peer reviewed journal articles. The results will also serve as an internal document for the Burns Paiute Tribe natural Resources Department and any other interested public organizations.